



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**  
**NATIONAL VEHICLE AND FUEL EMISSIONS LABORATORY**  
2565 PLYMOUTH ROAD  
ANN ARBOR, MICHIGAN 48105-2498

OFFICE OF  
AIR AND RADIATION

December 17, 2001

CCD-01-25 (LDV/LDT)

Dear Manufacturer:

Subject: Policy Revisions to Fuel Economy Testing of Vehicles Equipped with Select-Shift Automatic Transmissions

**Background**

This letter supercedes EPA guidance letter CCD-00-09 (LD), "Semi-Automatic Transmissions and Driver Selectable Devices", dated June 22, 2000. Since the issuance of that guidance, which was based on a specific transmission design, EPA has gained more knowledge about the wide variety of "semi-automatic" transmissions on the current market. We now believe it is desirable to have a more generalized process which will provide manufacturers with enough guidance to obtain EPA approval to test in a single mode with minimal EPA involvement during the approval process. This guidance letter describes the voluntary process for single mode testing of vehicles with automatic transmissions that may be shifted using more than one mode of operation.

Our basic multi-mode transmission policy is explained in guidance letter CD-87-01 and remains in effect:

"Barring substantial evidence that the vehicle will be driven predominantly in one mode, we will test the vehicle in both modes (or the two extreme modes if more than two modes exist), and harmonically average the results for use in fuel economy calculations. The term "predominant" means "nearly total usage of a given selectable mode" such as the use of "Drive" versus "2" in an automatic transmission."

A number of recent model year vehicles have been designed with driver-controllable gear shift capability which permits the automatic transmission to be shifted in a manner similar to a conventional manual transmission. These transmissions are known by a variety of names, but for purposes of this letter, EPA will call these automatic transmissions "select-shift" transmissions. The select-shift transmissions can generally fall into several types including those that permit shifting between gear ranges, for example, a five speed transmission with the gear ranges 1-2, 1-2-3, 1-2-3-4, and 1-2-3-4-5; those that may use the select-shift transmission to engage specific individual gears; and those that are designed to function with continuously variable transmissions (CVTs).

**Testing Policy for Select-Shift Transmissions**

Manufacturers wishing to forego EPA fuel economy testing using the select-shift mode may now demonstrate that the vehicle is predominantly operated in the "Drive" position by conducting and analyzing driver survey results which show the shift usage rate (driving time) in the "Drive"

position<sup>1</sup>. For the purpose of this policy regarding select-shift transmissions, EPA defines "predominantly" as meaning at least 75% of drivers will have at least 90% of the transmission shift operation (driving time in mode) performed in the "Drive" position, and on average, 75% of shift operation (driving time in mode) is performed in the "Drive" position.

In keeping with previous EPA policy, fuel economy results from vehicles using conventional automatic transmissions, such as a P-R-N-D-2-1 design without a select-shift transmission option, will continue to be based on tests conducted only in the fully automatic mode, or "Drive" position.

### **Default Testing Condition**

Manufacturers not meeting the "predominantly" criteria above, or choosing not to conduct a shift usage survey, will be required to submit fuel economy data from the vehicle tested in select-shift and fully automatic modes, and harmonically average the two sets of test results using 0.5 and 0.5 as the harmonic weighting factors.

### **Survey Design**

The following survey design criteria are requirements for determining the usage rate of the select-shift option:

- The survey shall be conducted by an independent survey organization.
- The survey respondents shall be the principal drivers of the vehicles and have driven the vehicles for several months.
- The minimum survey sample size is the lesser number of 30 percent of vehicle sales, or 100 respondents.
- Carlines may be combined into a single survey if they are sufficiently similar so as to generate equivalent usage rates. Manufacturers must make these grouping decisions using good engineering judgement. Survey results from these combined carline surveys should be analyzed to assure that respondents from each carline have similar usage rates. If the usage rates significantly vary between carlines initially grouped together for survey purposes, the manufacturer will separate the carlines and collect additional survey responses to meet the minimum 100 responses for each survey.
- The survey shall be conducted by telephone or mail and be designed to obtain unbiased quantitative estimates of select-shift usage.
- The shift usage survey may be combined with other questions not related to select-shift transmissions, but the survey should ask the principal driver with a qualifying vehicle "to estimate, in percent, the driving time spent in the select-shift usage

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Practically, fuel economy is affected only by up-shift events during vehicle operation that has both up-shift and down-shift events. This usage rate survey does not request drivers to distinguish between select-shift operation for up-shift vs. down-shift. EPA believes making this distinction would not significantly add to the accuracy of the results which are based on drivers' subjective estimates of their driving time in the select shift mode.

mode."<sup>2</sup> Manufacturers may specify the time period for usage assessment based on their best judgement. For example, the survey may ask the time spent in the select-shift mode during the last day, week, or month.

- Compliance with the "predominantly" criteria above (minimum 75% overall average usage rate in "Drive" position, and minimum 75% "Drive" position usage rate by 90% of the drivers), shall be calculated from an analysis of the responses and the corresponding usage rates.

Similar to recent EPA regulations requiring the manufacturers to exercise good engineering judgement in making decisions, EPA will not approve the shift survey in advance, but reserves the right to examine the survey and the results.

### **Instrumented Vehicles Alternative**

Manufacturers may also determine select-shift usage rates by instrumenting a sample of at least 50 vehicles and logging select-shift and "Drive" position shift events using representative drivers and the road route criteria of EPA Advisory Circular No. 72A. An analysis of the shift events shall be made on an individual vehicle basis to determine the percentage of "Drive" position shift usage. Analysis of the individual vehicle select-shift usage rates are then compared against the previously described 75% and 90% criteria. The instrumented vehicles may be provided by the manufacturer or the vehicle owner, but the driver must be the principal driver of a select-shift vehicle which they have driven for several months.

### **Carry-over/Carry-across of Shift Survey Results**

Vehicle manufacturers wishing to produce select-shift transmission vehicles in subsequent model years may carry-over the survey results for a transmission class in one model year to another (or carry-across within the same model year) based on good engineering judgement and select-shift designs which cover vehicles which have the same or similar criteria:

- Carline, or combined carlines based on good engineering judgement
- Location and actuation of the select-shift control
- Select-shift control of gear ranges or individual gears
- Shift gate pattern

Additionally, survey results may not be carried over for more than four model years and the manufacturer must document the rationale for carry-over/carry-across in its application for certification.

### **Start-up Provisions for Existing and New Select-Shift Transmission Designs**

Manufacturers who wish to introduce a new select-shift transmission design, or currently offer select-shift transmissions in their vehicles, may submit fuel economy data for the first model year using the "Drive" position while survey results are being collected. Survey results must be obtained

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<sup>2</sup> Because some select-shift transmissions may access the selection of gears or gear ranges from the "Drive" position, as opposed to a separate shift gate position, some manufacturers will need to use a different metric to determine the correct usage rate of the select-shift mode. An alternative metric should be quantifiable and based on good engineering judgement.

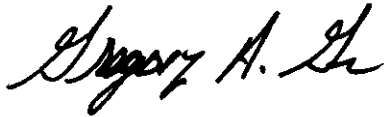
before the end of the model year, and depending on the results, actions may be required under EPA fuel economy regulations. If the survey results meet the 75% and 90% criteria, no additional actions are required. Should the survey fails to meet those criteria, the manufacturer must conduct fuel economy testing in both transmission modes and, if necessary revise the fuel economy labels by following EPA requirements for re-labeling under 40 CFR 600.314-01. CAFE calculations will be based on harmonically averaged data in the select-shift and "Drive" position modes.

**Effective Date of Guidance**

Manufacturers wishing to use single mode testing to test vehicles with select-shift transmissions may optionally use the criteria provided above in the 2002 model year and should use the criteria provided above for the 2003 and subsequent model years.

If you have any questions about this letter, please contact Martin Reineman by e-mail at [reineman.martin@epa.gov](mailto:reineman.martin@epa.gov) or by telephone at 734-214-4430.

Sincerely,

A handwritten signature in black ink, appearing to read "Gregory A. Green". The signature is fluid and cursive, with the first name "Gregory" being more prominent.

Gregory A. Green, Director  
Certification and Compliance Division  
Office of Transportation and Air Quality